marquardt AIRCRAFT CO.

Report No. PR 211-1
Enclosure (1)

(Unclassified Title)

LOW PRESSURE COMBUSTION INVESTIGATION

Contract No. NOa(s) 58-813

Marquardt Project No. 211

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I. INTRODUCTION

This is the first monthly letter progress report on Navy Contract NOa(s) 58-813 (MAC Project 211) for the period 2 December 1958 to 2 January 1959.

The objectives of this program are:

a. to evaluate combustion performance of a 28-inch diameter ramjet engine operating at combustion pressures less than 6 psia for pentaborane, HiCal-3, and SF-1 fuels

b. to evaluate the structural reliability of a full-scale nonmetallic tailpipe and exhaust nozzle

c. to determine the infrared radiation of the exhaust plume of a 28-inch ramjet engine operating at combustion pressures less than 6 psia with pentaborane, HiCal-3, and SF-1 fuels.

II. PROGRAM PROGRESS

Planning is in progress on all three phases of this experimental program. These phases will be integrated into a single test period which has been scheduled to start in Cell 8 of the Marquardt Jet Laboratory (MJL) on 9 February 1959 and will run through 18 February 1959.

For the combustion tests, sufficient hardware exists to run all tests and vary tailpipe lengths from two feet up to thirteen feet. Modification of fuel injectors is in progress, in order to handle both liquid and gaseous fuels. The HiCal-3 fuel has been received and the pentaborane is expected within a week.

The design of the nonmetallic tailpipe and exhaust nozzle has been completed, and fabrication of the part is now in progress at Goodyear Aircraft Corp., Akron, Ohio. A local source for a similar structure has been contacted and will supply same as an alternate or backup for the Goodyear part.

Plans are now set for the infrared measurement tests. The instrument to be used to scan the engine exhaust jet plume will be a Beckman IR-2 Infrared Spectrophotometer. This instrument is equipped with a motor-driven wave length drive which will permit the spectrum to be scanned over the desired spectral range from one to six microns. In addition, consideration is being given to traverse the jet so that a spectral analysis can be obtained at several points across the jet plume. In order to obtain absolute radiation measurements (as well as relative measurements among the three fuels), it is planned to set up a standard tungsten lamp and possibly a black body source at the position of the plume so that the instrument can be calibrated.

III. PROBLEMS ENCOUNTERED

A. Although the test period has been scheduled on the MJL test calendar, the authorization from the Air Force to run the tests in Cell 8 of MJL has not been received.

B. Contract coverage for the cost of operating Cell 8 of MJL has not been received.

C. The fabrication of the part from Goodyear is under a tight schedule. A possibility of a week's delay in delivery of this part may set the test back one week.

IV. ESTIMATED COST TO DATE

The estimated cost, including all commitments, through 28 December 1958 is:

$15,011.61

V. ANTICIPATED PROGRESS IN NEXT REPORT PERIOD

All plans for the experimental work will be completed and a finalized test plan issued. Essentially, all test hardware will be in final stages of completion (with the possible exception of the nonmetallic tailpipe). Pretest assembly of equipment, such as infrared instrumentation, will be initiated.